Claims

What is claimed is:

- 1. A method of optimizing the oxidation of molybdenite concentrates comprising:
 - a. forming an aqueous slurry of said molybdenite concentrates;
 - b. heating said slurry to a temperature of at least about 200°C;
 - agitating said slurry while in contact with an atmosphere containing free oxygen;
 - d. oxidizing said slurry in said atmosphere at an oxygen over pressure of at least about
 50 p.s.i.;
 - e. regulating the amount of ferric iron concentration and excess sulfuric acid concentration during the oxidation reaction; and thereby
 - f. producing a leach slurry wherein greater than about 99% of the molybdenum in said molybdenite concentrate is oxidized.
- 2. The method of claim 1 wherein less than about 20% or greater than about 80% of said oxidized molybdenum is soluble.
- 3. The method of claim 1 wherein said molybdenite concentrates contain copper and the copper dissolution is greater than about 99% in said leach slurry.
- 4. The method of claim 1 wherein said molybdenite concentrates contain iron and the iron dissolution is about 60-90% by weight in said leach slurry.
- 5. The method of claim 1 wherein the regulating step maintains said slurry in a relatively high excess sulfuric acid level to produce lower soluble silicon levels.
- 6. The method of claim 1 wherein the regulating step maintains said slurry in a relatively high ferric iron level to accelerate the rate of oxidation.
- 7. The method of claim 1 further comprising recycling a portion of said leach slurry produced in step (f) back to the forming step (a).
- 8. The method of claim 7 further comprising determining an approximation of the amount of soluble molybdenum.
- The method of claim 8 wherein the determining step is accomplished by monitoring concentrate analysis, recycle solution analysis, and pulp density.
- 10. The method of claim 1 wherein the oxygen over pressure in the oxidizing step ranges from about 80 to about 120 p.s.i.

- 11. The method of claim 1 wherein the temperature in the heating step ranges from about 210 to about 220 °C.
- 12. A method of predicting the soluble molybdenum present during the pressure oxidation of molybdenite concentrates comprising:
 - a. determining an approximation of the excess sulfuric acid concentration; and
 - b. determining an approximation of the soluble iron concentration.
- 13. The method of claim 16 wherein the determining step (a) is predicted from the concentrate weight and analysis plus the recycled solution volume and analysis.
- 14. The method of claim 16 wherein the determining step (a) further comprises:
 - a. effecting a preliminary calculation of the excess sulfuric acid concentration; and
 - b. refining said preliminary calculation by one or more further calculations wherein the excess sulfuric acid concentration value is corrected to compensate for additional molybdenum precipitation.